

Transfusion Camp for Nurse Practitioners
Module 1: Seminar B, 2023-2024
Plasma, PCC & Fibrinogen Cases, Dr. Aditi Khandelwal

Materials based on Transfusion Camp 2022-23 with permission from the Transfusion Camp Steering Committee

Case 1

A 56-year-old individual (78 kg) with atrial fibrillation presents to the emergency department with acute onset of severe shortness of breath and pre-syncope with any exertion. The patient is on warfarin – dose has been stable for 6 months without dose adjustment. They had some chest congestion last week and went to a walk-in clinic where they prescribed Clarithromycin. Heart rate is 130 bpm and blood pressure is 80/30 mmHg. Heart sounds are faint. JVP is grossly distended. Chest-x-ray reveals marked cardiomegaly. Cardiology has been paged for STAT echo for pericardial tamponade from hemorrhage. INR is 10.5. Patient is to undergo the life-saving procedure immediately.

1. Which one of the following is the most appropriate management strategy at this time?
 - A) 1 unit of plasma, vitamin K 10 mg po
 - B) 4 units of plasma, vitamin K 10 mg IV
 - C) PCC 3000 IU, vitamin K 10 mg IV
 - D) PCC 3000 IU, vitamin K 2 mg po
2. How fast should you run the PCCs into the patient?
 - A) As fast as you can push in by syringe
 - B) Each 1000 units is run over 1 minute
 - C) Each 1000 units is run over 5 minutes
 - D) Each 1000 units is run over 30 minutes
3. The interventional cardiologist wants to know when to expect that the INR will be normalized so that they can do the procedure. Which one of the following is true about warfarin reversal in this case?
 - A) Collect the INR sample immediately after infusion, proceed with the procedure, and give additional doses of PCC if the post-infusion INR > 1.5 and the patient has ongoing bleeding
 - B) Re-check the INR after PCCs to determine if additional doses are required before starting the procedure
 - C) The effect of PCCs will be seen immediately after administration in all patients and there is no need to re-check the INR
 - D) The effect of the treatment (PCCs and vitamin K) takes 6 hours to normalize the INR, so delay the procedure for 6 hours
4. Which of the following is an appropriate indication for PCC administration?
 - A) Elective reversal of oral anticoagulant therapy before a scheduled invasive procedure.
 - B) Rapid reversal of warfarin therapy or vitamin K deficiency in patients exhibiting major bleeding.
 - C) Reversal of warfarin therapy or vitamin K deficiency in patients requiring a surgical procedure within 12 to 24 hours.
 - D) Treatment of INRs over 8 to 10 without bleeding or need for surgical intervention.



Case 2

A 15-year-old adolescent (45 kg) presents to the emergency department feeling unwell for 2 weeks with fever, myalgias, malaise and anorexia. The patient was seen earlier today by the pediatrician who noted jaundice and referred the patient to a tertiary care pediatric emergency. On physical exam, the patient has mild abdominal distention (query ascites) and splenomegaly. There is no bruising except at intravenous puncture sites. The laboratory investigations show markedly elevated liver enzymes (ALT 234 IU, N<40 IU), a bilirubin of 76 $\mu\text{mol/L}$ (N<20), albumin 24 g/L (N>35 g/L), INR of 1.8 (N<1.2), fibrinogen of 1.2 g/L (N>2 g/L). The platelet count is $65 \times 10^9/\text{L}$ (N> $150 \times 10^9/\text{L}$). The hepatologist has recommended an urgent liver biopsy to determine the cause and severity of the liver disease. The transjugular liver biopsy is scheduled in 4 hours.

5. Which one of the following is the most appropriate transfusion strategy for this patient in preparation for the liver biopsy?
 - A) No need for transfusion at this time
 - B) Transfuse 1000 IU of PCC and 4 grams of fibrinogen concentrate (or 10 units of cryoprecipitate in the UK)
 - C) Transfuse 1 adult dose of platelets
 - D) Transfuse 3 units (15 ml/kg) of plasma to ensure INR is <1.5 before the procedure

6. The radiologist has requested that the INR be corrected to 1.2 or less. What should you do?
 - A) Call your staff physician and get direction on how to proceed
 - B) Delay the procedure for 1 day and see if the next radiologist will do it without INR correction
 - C) Discuss with the radiologist performing the procedure, the risks of plasma, explain why plasma is unlikely to lower the INR, and alert them to the 2019 Society for Interventional Radiology Guidelines
 - D) Transfuse 3 units plasma in an effort to lower the INR and get the liver biopsy completed

7. The patient subsequently develops a variceal bleed with hypotensive shock. Her INR is now 3.4 (N<1.2) and fibrinogen is 1.6 g/L (N>2). You should:
 - A. Transfuse 1 unit of plasma and repeat INR
 - B. Transfuse 5-10 mL/kg of plasma (2 units or 500 mL)
 - C. Transfuse 15 ml/kg of plasma (3 units or 750 mL)
 - D. Transfuse 4 grams of fibrinogen concentrate (or 10 units of cryoprecipitate in the UK)

Case 3a

A 35-year-old patient (65 kg) is admitted to the ICU from the ER with endocarditis within 4 hours of presenting to the hospital. The patient is not bleeding, is intubated for airway protection and on two inotropes. The patient's temperature is 39° C. Blood work is as follows: Hemoglobin 108 g/L, platelet count $18 \times 10^9/\text{L}$ (N> $150 \times 10^9/\text{L}$), INR 1.6 (N<1.2), aPTT 42 s (N<36 s), and fibrinogen 1.3 g/L (N>2.0 g/L). Her peripheral blood smear shows occasional fragments (schistocytes). Blood cultures are positive for gram-positive organism in 2/2 bottles; final culture results are pending. You make the correct diagnosis of sepsis related DIC. She is not bleeding and no procedures are planned in the next 6 hours.



8. Which one of the following is the most appropriate transfusion strategy for this patient?
- A) No transfusion indicated at this time
 - B) Transfuse 1 adult dose of platelets
 - C) Transfuse 1 adult dose of platelets and 4 units of plasma
 - D) Transfuse 1 adult dose of platelets and 4 grams of fibrinogen concentrate (or 10 units of cryoprecipitate in the UK)

Case 3b

A 17 year old patient is seen in the ER with profuse vaginal bleeding and hemorrhagic shock 6 hours after a pregnancy termination. The patient's BP is 90/50, HR 112, temperature is 38.1° C. Blood work is as follows: Hemoglobin 65 g/L, platelet count $28 \times 10^9/L$ ($N > 150 \times 10^9/L$), INR 1.4 ($N < 1.2$), aPTT 40s ($N < 36s$), and fibrinogen 1.1 g/L ($N > 2.0$). Ultrasound shows retained products of conception. She is hemodynamically unstable and you have ordered 2 units of uncrossmatched (you decide it would be imprudent to wait 60 minutes for crossmatched blood) O D-negative and K-negative red cells.

9. Which one of the following is the most appropriate transfusion strategy for this patient in addition to transfusing red blood cells?
- A) No transfusion indicated at this time
 - B) Transfuse 1 adult dose of platelets
 - C) Transfuse 1 adult dose of platelets and 4 units of plasma
 - D) Transfuse 1 pool of platelets and 4 grams of fibrinogen concentrate (or 10 units of cryoprecipitate)

Case 3c

A 35-year-old patient is admitted to the hematology service following a diagnosis of acute promyelocytic leukemia (APL). APL is associated with a high rate of early hemorrhagic deaths from ICH. The patient is afebrile with stable vital signs and the patient's only complaints are fatigue and a petechial rash on their legs. Blood work is as follows: Hemoglobin 74 g/L, platelet count 18, WBC 63, INR 1.4, aPTT 39 s, and fibrinogen 0.9 g/L. The patient is to start emergency induction chemotherapy tonight, and is not bleeding.

10. Which one of the following is the most appropriate transfusion strategy for this patient?
- A) No transfusion indicated at this time
 - B) Transfuse 1 unit RBC and 1 adult dose of platelets
 - C) Transfuse 1 unit RBC and 4 grams of fibrinogen (or 10 units of cryoprecipitate)
 - D) Transfuse 1 adult dose of platelets and 4 grams of fibrinogen (or 10 units of cryoprecipitate)

Case 4.

You are providing the anesthetic for an 11-year-old undergoing scoliosis surgery with a pre-op weight of 39 kg. Pre-op blood work: hemoglobin 118 g/L, MCV 78, Platelet count 288. No INR was done pre-op as the bleeding assessment tool (bleeding questionnaire eg. MCMDM1) was negative for a bleeding history. At the 2 hour mark of the surgery, approximately 2500 mL of blood loss is recorded and you have transfused 3 units of red blood cells. STAT blood work reveals: hemoglobin 78 g/L, PLT count 134 ($N > 150$), INR 2.1 (< 1.2), PTT 45 ($N < 36$) and fibrinogen 1.3 ($N > 2$). The surgeon expects to lose another 1000 mL over the next hour. You have not administered any plasma, platelets or fibrinogen yet.



11. Which one of the following is the most appropriate component strategy for this patient?
- A) Transfuse 1 dose platelets (10-15 mL/kg)
 - B) Transfuse 2000 IU of PCC
 - C) Transfuse 3 units (15 mL/kg) of plasma and 2 grams of fibrinogen (50 mg/kg) or 5 units of cryoprecipitate
 - D) Transfuse or 2 grams of fibrinogen or 5 units of cryoprecipitate

Case 5

A 67-year-old is admitted to the ICU with septic shock. They receive aggressive fluid resuscitation with normal saline, vasopressor support, and empiric antibiotic therapy. A total of 6 L of IV fluids has been administered.

12. What do you suggest for ongoing fluid resuscitation:
- A) Switch from IV normal saline to 5% albumin
 - B) Switch from IV normal saline to 25% albumin
 - C) Continue IV normal saline (or another crystalloid)
 - D) Switch from crystalloid to colloid

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